CLAIMS

What I claim as my invention is:

1. A method of transmitting optical data within a network space, comprising: illuminating the network space with a plurality of illumination sources powered by a common alternating current power source and then applying a modulation signal to the alternating current power source such that the illumination of each of the plurality of illumination sources is modulated in response thereto, providing optical data signals.

2. A power modulation unit which imposes a modulation signal on an electrical power waveform, comprising: main input terminals for connection to an external electrical energy source; a transformer coupled to the input terminals, said transformer having a first and second ratio of turns between a primary winding and a secondary winding; a switching circuit operatively coupled to the transformer, the switching circuit being responsive to a signal to selectively switch between one of the first and second ratio of turns of the transformer; modulated electrical power output terminals coupled to the transformer and for external connection to a lighting load.

3. An apparatus for modulation of the power signal supplying electricity to one or more electrical lamps so as to produce changes in the light output of these lamps and resulting from the switching mechanism of a transformer in which a primary tap selector is activated based on a synchronization circuit and is activated by data signals from a computer system and resulting in optical through the air signals by the electrical lamps.

4. The method for interfacing the apparatus of claim 2 at a location near the AC power source so that all lamps being modulated are located downstream of the modulation signal and in such a manner so as to enable the use of standard types of lamps and ballast combinations for different types of standard electrical light fixtures.

5. The method for creating an optical broadcasting network by modulation of the electrical power supplying electrical lamps by means of the apparatus of claim 2 which impresses voltage changes that result in changes in the luminous flux of light fixtures.

6. The method for broadcasting optical data signals through the air, by means of modulation of the brightness levels of an electrical illumination network comprised of one or more electrical light fixtures, a network of electrical light fixtures all being supplied electrical power from the apparatus of this invention and comprising one or more specialized optical receivers capable of reception of these optical signals.

7. The method for optical-through-the-air communications by means of remotely creating changes in the illumination levels of an entire lighting network or luminaire consisting of two or more light fixtures supplied power from the apparatus of claim 2.

8. The method for synchronization of data and the electrical current waveform in an AC light modulation system whereby optical signals are created so as to convey information and data to specialized detectors using digital signal processing for demodulation and decoding, employing a digital signal processing technique whereby a dynamic comparator is created by continuous and rapid sampling of the ambient light.

9. The method whereby voltage modulation of the electrical power supplying one, two or more electrical light fixtures connected to this apparatus is generally imperceptible to the human eye due to the synchronization of data and the waveform of the electrical current by means of a micro-controller based software program.

10. The method and apparatus for ambient light modulation of the brightness of any environment illuminated by electrical light fixtures, whenever these light fixtures are powered from a common electrical energy source or any sub-branches of that same electrical energy source, and are all connected to the apparatus disclosed by the present invention at any given location in the electrical power distribution network.

11. The method and apparatus for AC power source light modulation whereby the voltage modulation is impressed upon the power signal by means of an electronically controlled transformer, switching between a tapped primary-to-secondary and a normal-primary-to-secondary winding ratios, based on timing each switching action occurring without creating electromagnetic interference nor significant amounts of heat due to the switching occurring at a time when the AC power signal is near or at the zero voltage crossing point of the waveform.

12. The method and apparatus for producing optical signals in standard types of lamps by causing modulated electrical energy to supply from an upstream location, one or more electrical light fixtures, including gas discharge lamps like fluorescent lamps in a manner such that users may obtain the ability to broadcast information from these existing lighting fixtures without having to retro-fit or change in any manner the existing light fixtures.

13. The method and apparatus whereby the electrical energy supplying one or more light fixtures is used as the carrier of information in order to cause electrical lamps to produce changes in a lighting network so as to broadcast optical signals that are detectible by digitizing the AC waveform produced by these lamps; and conveyed optically to one or more optical detectors provided with an analogue to digital converter and a micro-controller capable of transforming these signals into useful information.

14. The method for modulation of a commercial AC powered lighting circuit by means of a delta transformer arrangement which provides for modulating the power signal in each one of the three phases by the apparatus of claim 9 so as to produce changes in the three phases supplying power to an electrical lighting network.

15. An optical receiver with a design architecture which incorporates a display layer positioned to be visible by a user, a transflective layer positioned behind the display layer as needed, a photovoltaic layer positioned behind the display layer and a circuit layer positioned behind the photovoltaic layer; the circuit layer being electrically connected to the display layer and the photovoltaic layer.

16. A power modulation apparatus comprising an electrical energy waveform sampling circuit, a data buffer circuit, the data buffer circuit having a data input terminal, a data output terminal and a clock input terminal, the data output terminal being electrically connected to the control input terminal of the switching circuit, the clock input terminal being electrically coupled to the electrical energy waveform sampling circuit and the data input terminal is connectable to an external data source.

17. The system for data communication in a space illuminated by a plurality of illumination sources wherein the power modulation unit further comprises: suitable input terminals for connection to an external electrical power source; a transformer, said transformer having first and second primary terminals, a tapped primary terminal and first and second secondary terminals, the first primary terminal being electrically coupled to the first input terminal, the first and second secondary terminals being connectable to an external illumination circuit such as one or more electrical light fixtures.

18. The power modulation unit of claim 2, wherein the switching circuit further comprises first and second suitable semiconductor switching devices such as silicon-controlled-rectifiers; the first semiconductor switch being coupled between the second terminal and the tapped primary terminal, the second semiconductor switch being coupled between the second terminal and the second primary terminal, the gate of the first semiconductor switch is responsive to the data output signal from the data buffer circuit and the gate of the second semiconductor switch is responsive to the complement of the data output signal from the data buffer circuit.

19. An AC power light modulation unit comprising: electrical power input terminals for connection to an external electrical power source, a transformer, said transformer having first and second primary terminals, a tapped primary terminal and first and second secondary terminals, the first primary terminal being electrically coupled to the first power input terminal, the first and second secondary terminals being connectable to an external illumination circuit; and a switching circuit interposed between the power input terminals and the transformer, the switching circuit selectively connecting the power terminals to either the first primary and tapped primary terminals or to the first primary and second primary terminals in response to a received external data signal.

20. A method of transmitting data within a network space, comprising: illuminating the network space with a plurality of illumination sources powered by a common electrical energy source ; and applying a modulation signal to the electrical energy waveform such that the total illumination within the network space is modulated in response thereto by means of small variations in total brightness that are imperceptible to the human eye due to their short duration and the timing and coding methods.

21. An optical receiver, formed in a multilayer construction, comprising: a display layer positioned to be visible to a user, said display layer being at least partially light transmissive; a photovoltaic layer positioned behind the display layer; and a circuit layer positioned behind the photovoltaic layer.